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Published in:
Danish Medical Journal

Publication date:
2019

Document version
Publisher's PDF, also known as Version of record

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ABSTRACT

INTRODUCTION: Psychosocial assessment of pre-bariatric patients is an internationally recommended practice. However, the applicability of the assessments remains unaccounted for. This study investigated if the allocation of bariatric surgery candidates to a high-risk category on the basis of a psychosocial assessment correlates with attenuated weight loss and reduced mental health improvements.

METHODS: The assessment procedure consisted of standardised psychometric questionnaires, structured diagnostic interviews and semi-structured interviews. Outcome measures were BMI and psychiatric symptom load measured by the Symptom Checklist 90 at baseline and 18 months after surgery. All patients received either the gastric bypass or sleeve gastrectomy procedure.

RESULTS: Forty pre-bariatric patients participated in the study. The findings point towards an enhanced weight loss but reduced mental health improvement in the high-risk category.

CONCLUSIONS: Eating disorder symptomology might explain the efficient weight loss results in the high-risk category. The high-risk category may have more mental health issues that are unrelated to obesity, which explains the proportionally reduced mental health improvement. The study calls for further research involving a larger study population and a longer follow-up period.

FUNDING: The work was carried out as a part of the research programme Governing Obesity, funded by the University of Copenhagen Excellence Programme for Interdisciplinary Research.

TRIAL REGISTRATION: ClinicalTrials.gov Identifier: NCT02070081.

Current clinical guidelines consider psychosocial assessments of bariatric surgery (BS) candidates an "integral part of the patient's pre-operative evaluation" [1]. However, there are vast local differences in the extent to which these guidelines are implemented. Whereas 86.4% of bariatric clinics in the USA conduct some type of psychological assessment for every patient [2, 3], in Denmark, BS candidates undergo no formal psychosocial assessment.

The aim of the assessments has traditionally been to identify psychosocial contraindications to surgery [4]. This gate-keeping role is somewhat controversial, mainly due to the fact that relatively few psychological variables constitute a contraindication [5, 6].

In the present study, it was investigated whether a psychosocial assessment of BS candidates can predict the outcome of surgery. The hypotheses were that a "high-risk" allocation based on a psychosocial assessment would correlate with reduced weight loss and mental health improvements 18 months after surgery. The study was exploratory, with the aim of preparing hypotheses to be tested in future studies.

METHODS

The study was approved by The National Committee on Health Research Ethics. All participants provided written, informed consent (H-3-2013-138).

A total of 40 psychosocial assessment interviews were conducted eight weeks before surgery at the Bariatric Clinic, Zealand University Hospital, Køge, Denmark in the period from May to October 2015. After each interview, a detailed interview report, complete with clinical impressions and psychometric test results, was composed. Based on research literature concerning psychosocial contraindications for surgery [1, 3, 6-10], BS candidates were then allocated into either a "low", "some" or "high" risk-group. All candidates subsequently had surgery performed. The participants' BMI and psychiatric symptom load measured at baseline and 18 months after surgery were applied as outcome measures.

Participants

Danish national health guidelines approved candidates as eligible for surgery if they met the following requirements: age ≥ 25 years, BMI ≥ 50 kg/m^2, or BMI ≥ 35 kg/m^2 in combination with a concomitant disease listed as diabetes mellitus type two, obstructive sleep apnoea, unregulated hypertension, polycystic ovary syndrome or arthrosis in a lower extremity. From referral to surgery, candidates must also lose weight, equivalent to 8% of their excess weight, by dieting. Additionally, patients must have tried conventional weight loss methods and exhibit no contraindications, defined as mental illness, drug abuse, eating disorders or mental defi-

ORIGINAL ARTICLE

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Dan Med J 2019;66(2):A5532

ciency. These behavioural and mental-health related issues are, however, not formally assessed [11].

A total of 61 participants were recruited after their first visit to the bariatric clinic. At the time of the psychosocial assessment interview, 15 had dropped out: eight had declined or were rejected for surgery, four chose sleeve gastrectomy (SG) (at n = 22, the inclusion criterion also included SG surgery), and two stopped responding to phone calls. The remaining 46 participants were interviewed approximately eight weeks before their scheduled surgery. After the interview, another three participants dropped out because they decided to postpone surgery. In total, 43 participants went on to have surgery performed. After surgery and before the 18-month follow-up, another three patients were excluded from the study due to pregnancy. At the 18-month follow-up, 40 participants were included.

Design

The research and assessment process was not integrated with the clinical practice and decision making. Seeing that psychosocial assessments are not practiced at Danish bariatric facilities, this shortcoming in the care regime allowed for an investigation of how high-risk candidates actually perform after surgery, since candidates would proceed unaffected regardless of their assessment conclusion.

Interview

An assessment interview coined the Copenhagen Bariatric Interview (COBI) was constructed by the first author. The COBI combines domains from previously published guides for the assessment of pre-bariatric patients [12-14] and integrates standardised diagnostic assessment tools within the interview (see **Table 1**) (please acquire the COBI by contacting the corresponding author).

All interviews were held at the Bariatric Clinic eight weeks before the scheduled surgery. At this time, participants were in the process of losing 8% of their overweight in accordance with local bariatric surgery guidelines [11].

Questionnaires

For the outcome analysis, the t-score from the Global Severity Index (GSI) within the revised Symptom Checklist 90 (SCL-90-R) was applied. The SCL-90-R is a widely applied outcome measure that has been validated in BS patients [15]. For the conversion of raw scores to t-scores, Danish norms for men and women were applied [16].

For the interview assessment report, results from a variety of questionnaires besides the SCL-90-R were incorporated (see Table 1). For a detailed description of all the questionnaires within the COBI report, we refer to Christensen et al [17].

Interview report

After each assessment interview, a written report was prepared by the first author. The report starts with an introduction of the participant and then summarises statements, results from relevant questionnaires and clinical impressions for each of the listed domains (see Table 1). The report concludes with an allocation of the participant into either a low, some, or high-risk category.

The allocation of participants to risk groups was conducted in line with best practice guidelines on psychosocial assessment of BS patients [1, 8, 10]. According to these, active psychosis and mental retardation elicit a high-risk ranking due to problematic consent. Severe current psychopathology and low social support have been found to attenuate weight loss and would indicate a "high" or "some risk" allocation. Binge Eating Disorder, night eating syndrome, emotional eating and previous substance abuse were considered potential risk factors. The final assignment of patients to one of three risk groups is the result of an overall assessment. **Table 2** provides case examples from each risk category.

Data analysis

Four questionnaires from the 18-month follow-up were lost in the mail system. In these instances, the last observation was carried forward, which implied utilising the six-month follow-up from the SCL-90-R. This method was chosen since there were only insignificant changes in SCL-90-R responses from six (mean = 49.9, standard deviation (SD): ± 12.62) to 18 (mean = 49.1, SD: ± 12.71) months; ($t(34) = 0.669$, $p = 0.508$).

Risk allocation was tested for inter-rater reliability by having a blinded colleague (the second author) rate eight (20%) cases from the sample of 40 cases. There was total agreement in the eight pairs of ratings, which produced three ratings of low risk, three ratings of some risk and two ratings of high risk. The intra-class correlation was thus, necessarily, 1.0, albeit this was not statistically significant due to the limited number of cases.

For the statistical analysis, IBM SPSS statistics 24 was applied. Group differences from baseline to 18 months post-surgery were measured with a one-way between-subjects ANOVA. When significant, the ANOVA was followed by planned contrast when testing hypotheses.

Trial registration: ClinicalTrials.gov Identifier: NCT02070081.

TABLE 1

Overview of the Copenhagen Bariatric Interview.

Domain	Assessment	Supplementary psychometry
Attitudes towards surgery		
Expectation	Are expectations realistic?	-
	Are they rigid or flexible?	
Motivation	Is motivation internal or external in origin?	-
	Is motivation high or low?	
Adherence	Is adherence to diet high or low?	-
Ambivalence	Is ambivalence towards surgery high or low?	-
Knowledge	Is level of information and/or cognitive ability sufficient?	-
Timing	Is the timing for receiving surgery right or is private life unsettled?	-
Medical health		
Perception of health	Is the candidate's perception of personal health good or bad?	-
Diagnoses	Is surgery likely to improve medical health?	-
Pain	Are levels of pain high or low?	-
	Is surgery likely to relieve pain?	
Medication	Are there any medications the candidate will not be able to tolerate after surgery?	-
Sleep-pattern	Is surgery likely to improve quality of sleep?	-
Weight history	Is the candidate able to lose weight and maintain weight loss?	-
Physical activity	Is the candidate likely to be physically active post-operatively?	-
Social support		
Support for surgery	Is the candidate likely to receive sufficient social support post-operatively?	-
Social network	Is the candidate's social network strong or weak?	-
Eating behaviour		
Eating disorders	Does the candidate fulfil the diagnostic criteria?	Structured Clinical Interview for Diagnostic and Statistical Manual of Mental Disorders I module h
	What are past and current severity of symptoms?	Proposed criteria for night eating disorder
	Are binges driven mainly by restriction in diet or by negative affect?	Eating disorder risk composite from Eating Disorder Inventory-3
Maladaptive eating	How reflective is the candidate about eating patterns, and their possible influence on weight and post-operative challenges?	-
Attitudes towards body shape and weight		
Feelings	Has the candidate internalised weight bias stigma?	Weight Bias Internalisation Scale
Behaviour	What are the behavioural consequences of internalised stigma?	-
Mental health		
Depression	Is the candidate suffering from severe and/or untreated depression?	Beck's Depression Inventory
	Are the symptoms related to obesity?	Symptom Checklist-90-R: depression subscale
Personality	Could the candidate's personality impede adherence?	Standardised Assessment of Personality - Abbreviated Scale
Anxiety	Is the candidate suffering from severe and untreated anxiety?	Symptom Checklist-90-R: anxiety and phobic anxiety subscales
	Are the symptoms related to obesity?	
Suicide and self-harm	Is the candidate currently suicidal?	Beck's Depression Inventory: items 2, 9
	Is the patient at risk of becoming suicidal?	Symptom Checklist-90-R: items 15, 54, 59
Trauma	Is the obesity related to traumatic events?	-
	Are the traumatic events unresolved?	
Psychiatric treatment	Is the amount of psychiatric treatment high or low?	Symptom Checklist-90-R: Global Severity Index
	How does the candidate cope with mental illness?	
Substance dependence		
Alcohol	Has the candidate at some point in life been addicted to alcohol?	Alcohol use disorders identification test consumption
	What is the current intake of alcohol?	
Drugs	Has the candidate at some point in life been addicted to medication or drugs?	-
Food	Does the candidate consider food an addiction?	Yale Food Addiction Scale

RESULTS

For the full sample, the mean drop in BMI points and psychiatric symptom load (GSI) from baseline to the 18-month follow-up was highly significant (BMI: $t(39) = 14.422$, $p = 0.000$, GSI: $t(39) = 7.797$, $p = 0.000$). Sample characteristics are listed in Table 3.

BMI and risk group

A one-way between-subjects ANOVA was conducted to compare baseline BMI between the high, some and low-risk groups. This revealed no significant difference in baseline BMI at the $p < 0.05$ level for the groups $F(2, 37) = 0.612$, $p = 0.548$.

In order to compare weight loss between the three groups, a one-way between-subjects ANOVA was conducted. This showed a marginally significant difference in BMI points lost between the three groups $F(2, 37) = 3.003$, $p = 0.062$. The following planned contrast revealed that the mean BMI drop for the high-risk group was significantly different from the some and low-risk groups, $t(37) = 2.301$, $p = 0.027$, while the scores from the low and some risk groups did not differ significantly from each other $t(37) = –0.677$, $p = 0.502$. Using partial η^2 as the measure of association, the interaction between BMI points lost and risk group affiliation accounted for 14% of the total variability between the groups ($\eta^2 = 0.14$).

Psychiatric symptom load and risk group

A one-way between-subjects ANOVA was conducted to compare baseline psychiatric symptom load between the high, some and low-risk group. This revealed a highly significant difference in psychiatric symptom load at the $p < 0.05$ level for the three conditions $F(2, 37) = 8.242$, $p = 0.001$. When analysed further with planned contrast, the mean baseline score for the high-risk group proved to be highly significantly different from the low and some risk groups $t(37) = 3.535$, $p = 0.001$). The some and low-risk groups did not, however, differ significantly from each other $t(37) = –1.737$, $p = 0.091$. The interaction between baseline psychiatric symptom load (GSI) and risk group affiliation accounted for 31% of the total variability between the three groups ($\eta^2 = 0.31$).

A one-way between-subjects ANOVA was conducted to compare the drop in psychiatric symptoms between the three conditions. This did not show significant differences between the three groups $F(2, 37) = 0.293$, $p = 0.748$.

Further, a one-way between-subjects ANOVA was conducted to see if the high-risk group still differed significantly from the low and some risk group with regards to psychiatric symptom load at 18 months after surgery. The result showed that a highly significant difference remained in psychiatric symptom load between the three groups $F(2, 37) = 6.838$, $p = 0.003$. The following planned contrast revealed that the mean score for the high-risk group was significantly different from the two other groups $t(37) = 3.428$, $p = 0.002$. As was the case at baseline, no significant difference between the some and low-risk groups was found at the 18-month follow-up $t(37) = –1.137$, $p = 0.263$. The interaction between psychiatric symptom load (GSI) at the 18-month follow-up and risk-group affiliation accounted for 27% of the total variability between the three groups ($\eta^2 = 0.31$).

TABLE 2

Case examples.

Risk level	Examples
High	A 48-year-old woman with active binge eating disorder, social phobia and depression
	Previous psychopathology includes anorexia nervosa (age 17-21 yrs) and bulimia nervosa (age 21-39 yrs)
	The patient discloses childhood sexual abuse and reports frequent suicidal thoughts
	The surgery is verbalised as "a last chance"
	Adherence to pre-operative diet is problematic
	A 39-yr-old man with active night eating syndrome
	Currently, he is also suffering from depression which began three years ago, after rehabilitation from 17 years of drug abuse
	Suicidal thoughts have been prevalent since childhood
	The patient currently has pronounced post-traumatic stress symptoms after a violent attack
	The patient's girlfriend has chronic mental health issues
Some	A woman, aged 52 yrs, with sub-clinical binge eating disorder
	She describes her mood as "very good and very stable", and has never struggled with any mental health issues
	The eating binges are described as "annoying", and she hopes the surgery will be able to help her limit them
	She is unable to explain the surgery in much detail, but is knowledgeable about the post-operative diet and is also adherent to the pre-operative weight loss
	A man, aged 28 yrs, who currently suffers from anxiety due to an ongoing threat imposed upon him
	He has recently lost his job and appears angry and hostile
	He wants surgery because of his diabetes and is uninterested in weight loss per se
	He has previously exercised a lot, and plans to resume this after surgery
	He is knowledgeable about the surgical procedures and pre-operative diet
Low	A woman aged 43 yrs with no current psychopathology
	Previously, she suffered from anxiety attacks for which she was in psychotherapy with a good outcome
	Her course of life has been influenced by the early death of both parents and by becoming a single mom at 17 yrs of age
	The patient wants surgery because of physical ailments, and her knowledge of surgery and post-operative diet is high
	She wants to advance the date of surgery since her pre-operative weight loss has already been achieved
	A man aged 47 yrs with no current psychopathology
	The patient reports one suicide attempt when he was a teenager
	As a child he was removed from his home by the social services
	The patient reports that he seeks professional help in crisis situations
	The patient seeks surgery because of diabetes and has no body dissatisfaction
	He is well-informed and reflective about the procedures

Summary of results

Although there were no significant differences in BMI between the three risk groups at baseline, the high-risk group exhibited a more pronounced weight loss than the two lower risk groups. At baseline, the high-risk group unsurprisingly showed a significantly poorer mental health result than the other risk groups, a result that was still apparent 18 months after surgery. Eighteen months after surgery, all three risk groups maintained a significant decline in psychiatric symptoms. Unlike the BMI, the decline in psychiatric symptoms did not vary significantly among the three groups. The effect of the weight loss on psychiatric symptoms was not more enhanced in the high-risk group than in the other groups despite the more effective weight loss among high-risk patients.

DISCUSSION

The hypotheses that a high-risk allocation by psychosocial assessment would correlate with reduced weight loss and reduced mental health improvements 18 months after surgery were not confirmed. Thus, in this study, psychosocial assessment of BS candidates could not predict the outcome of surgery. Surprisingly, the high-risk group actually exhibited the most striking weight loss. It could be considered that an "all or nothing" cognitive strategy, which is often observed in persons with eating disorders, might have pushed the weight loss forward. Following this line of thought, a later weight regain could be expected in the high-risk group, since food restriction is hard to uphold over time and is associated with a risk of binge eating [18]. It may further be speculated that when experiencing difficulties with adapting eating habits to their post-operative anatomy, participants in the high-risk group did not find the resources to select and create new meals, and that they instead gave up and consumed too little food. According to this and also to the former argument, the high-risk group in a sense lost too much weight. A longer follow-up period could have shed light upon these arguments.

Concerning the reduction in psychiatric symptoms, this study suggests a relationship between weight loss and a reduction of psychiatric symptoms following BS. However, since the high-risk group did not have a more pronounced reduction of psychiatric symptoms despite a higher weight loss, weight loss and reduction in psychiatric symptoms do not seem to be associated at the same level for the high-risk group as for the some and the low-risk group. This may indicate that there are more psychiatric symptoms that are independent from the obesity within the high-risk group than within the other groups, or that psychiatric symptoms may contribute to development of obesity. Again, a longer follow-up, extending past the so-called "honeymoon phase" [19], is required. However, our findings point to the complex relationship between obesity and psychopathology – a causality that probably works in both directions.

From these results, it could be considered whether psychosocial assessments of BS patients would be more useful if used in the context of personalisation of treatment for patients rather than for evaluation of eligibility for surgery. This, however, presupposes that resources are available facilitating enhanced care, i.e., psychoeducation, therapeutic interventions and longer follow-up periods.

Limitations of this study

A strength of this study is the inclusion of high-risk BS patients in the sample. To our knowledge, this group has been excluded in otherwise similar studies. Even so, the study is limited by the low sample size and by the unequal distribution of participants among the three risk groups, with only five patients assigned to the high-risk group, making the potential for generalisation limited. Another limitation is the limited length of the follow-up period.

CONCLUSIONS

In this study, high-risk patients lost more weight after BS but had similar mental health benefits as low or some risk patients. Possible explanations for the very good weight loss results in the high-risk group are:

TABLE 3

Sample characteristics and development in outcome measures.

	Full sample (N = 40)	High risk (n = 5)	Some risk (n = 14)	Low risk (n = 21)
Age, yrs, mean ± SD	40.1 ± 9.2	34.4 ± 9.5	38.9 ± 10.7	42.3 ± 7.7
Gender, n (%)				
Male	6 (15)	1 (20)	2 (14.3)	3 (14.3)
Female	34 (85)	4 (80)	12 (85.7)	18 (85.7)
BMI, kg/m², mean ± SD				
Baseline	44.0 ± 6.8	47.3 ± 3.8	45.7 ± 7.1	44.0 ± 7.1
18-mo. follow-up	30.7 ± 4.9	27.1 ± 3.8	31.2 ± 4.5	31.2 ± 5.2
BMI points lost	14.5 ± 6.1	20.2 ± 4.3	14.5 ± 6.5	13.2 ± 5.6
Weight, kg, mean ± SD				
Baseline	130.2 ± 21.8	141.8 ± 20.4	130.1 ± 22	127.5 ± 22.1
18-mo. follow-up	88.6 ± 15.9	82.1 ± 19.4	89.4 ± 18	89.7 ± 13.9
Weight loss	41.5 ± 18	59.7 ± 9	40.7 ± 17.9	37.8 ± 17.5
Psychiatric symptoms, GSI[a], mean ± SD				
Baseline	58.4 ± 10.4	72.0 ± 6	59.6 ± 7.7	54.3 ± 10
18-mo. follow-up	48.9 ± 12.2	64.6 ± 6	49.1 ± 12.2	45.0 ± 10.3
GSI points lost	9.5 ± 7.7	7.4 ± 5.3	10.5 ±7.6	9.4 ± 8.5

GSI = Global Severity Index; SD = standard deviation.
a) The normal spectrum is 50 ± 10.

High-risk patients could be more prone to dichotomous thinking, which may have mobilised weight loss. The high-risk group may have experienced difficulty adapting their eating habits to their post-operative anatomy, and in consequence hereof may have started to consume too little food.

With respect to mental health, it was suggested that the high-risk group had more mental health issues unrelated to obesity, which could explain why the weight loss did not decrease mental health symptoms to the same extent as for the two lower risk conditions.

Psychosocial assessment of BS patients is suggested as a means of personalising BS care.

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ACCEPTED: 18 December 2018

CONFLICTS OF INTEREST: none. Disclosure forms provided by the authors are available with the full text of this article at Ugeskriftet.dk/dmj

ACKNOWLEDGEMENTS: The authors would like to extend their gratitude to *Tom Teasdale*, University of Copenhagen, for providing statistical advice.

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